IN THE CLAIMS:

Please consider the claims as follows:

1. (Currently Amended) A method of locating an object producing an acoustic wave, the acoustic wave being detected by a plurality of passive acoustic detectors formed in an array to produce at least three signals, the method comprising:

(a) determining a wavelet ~~correlatable~~ that correlates with each of the at least three signals, said wavelet being derived from an acoustic wave of a known form;

(b) determining time difference of arrival (TDOA) measurements between the at least three signals using correlation intensity with said wavelet;

(c) performing acoustic reciprocity at a pre-determined time interval from each of the plurality of detectors based on said TDOA measurements resulting in a hemisphere centered around each of the plurality of detectors;

(d) examining hemispheres produced from step (c) to determine an intersection point of at least three hemispheres; and

(e) repeating (c) and (d) with a further time interval to increase the size of said hemispheres if said intersection point is not determined;

wherein said intersection point represents a location of the object.

2. (Original) The method according to claim 1 wherein said acoustic wave of a known form from which said wavelet is derived is produced by a known object and wherein said known

object provides an identity for the object from which the at least three signals are obtained.

3. (Original) The method according to claim 1 wherein step (b) includes:

determining points of peak correlation between said wavelet and each of the at least three signals; and

measuring a time difference of said points of peak correlation between the at least three signals to form said TDOA measurements.

4. (Original) The method according to claim 2 wherein step (b) includes:

determining if each of said TDOA measurements meets validity criteria based on a time difference of acoustic wave detection between each of the plurality of detectors and possible speeds at which the object may be moving given said identity; and

storing TDOA measurements that meet said validity criteria.

5. (Original) The method according to claim 1 wherein step (c) includes:

generating a location hemisphere for each of the plurality of detectors based on an earliest acoustic wave detection time, said TDOA measurements and the velocity of the acoustic wave; and

expanding each of said location hemispheres using said time interval.

6. (Original) The method according to claim 5 wherein the step of generating includes:

determining a first detector from the plurality of detectors having the earliest time of

detection of the acoustic wave; and

generating said location hemisphere for each of the plurality of detectors, wherein a start radius for each of said location hemispheres is reflective of said TDOA measurement between each of the plurality of detectors and said first detector; and wherein the step of expanding includes:

expanding said location hemisphere for each of said plurality of detectors with said time interval using the velocity of the acoustic wave.

7. (Currently Amended) A method of locating an object producing an acoustic wave by passive detection of the acoustic wave, the method comprising:

(a) producing at least three signals from detection of the acoustic wave at a plurality of passive acoustic detectors formed in an array;

(b) determining a wavelet ~~correlatable~~ that correlates with each of the at least three signals correlates, said wavelet being based on an acoustic wave of a known form;

(c) determining time difference of arrival (TDOA) measurements between said at least three signals using correlation intensity with said wavelet;

(d) performing acoustic reciprocity at time intervals from each of said plurality of detectors based on said TDOA measurements resulting in a hemisphere centered around each of said plurality of detectors; and

(e) examining hemispheres produced from step (c) to determine an intersection point of at least three hemispheres at each of said time intervals;

wherein said intersection point represents a location of said object.

8. (Original) The method according to claim 7 wherein said acoustic wave of a known form from which said wavelet is derived is produced by a known object and wherein said known object provides an identity for the object from which the at least three signals are obtained.

9. (Original) The method according to claim 7 wherein step (b) includes:

determining points of peak correlation between said wavelet and each of said at least three signals; and

measuring a time difference of said points of peak correlation between said at least three signals to form said TDOA measurements.

10. (Original) The method according to claim 8 wherein step (b) includes:

determining if each of said TDOA measurements meets validity criteria based on a time difference of acoustic wave detection between each of said plurality of detectors and possible speeds at which the object may be moving given said identity; and

storing TDOA measurements that meet said validity criteria.

11. (Original) The method according to claim 7 wherein step (c) includes:

generating a location hemisphere for each of said plurality of detectors based on an earliest acoustic wave detection time, said TDOA measurements and the velocity of the acoustic wave; and

expanding each of said location hemispheres using said pre-determined time interval.

12. (Original) The method according to claim 11 wherein the step of generating includes:

determining a first detector from said plurality of detectors having the earliest time of detection of the acoustic wave; and

generating said location hemisphere for each of said plurality of detectors, wherein a start radius for each of said location hemispheres is reflective of said TDOA measurement between each of said plurality of detectors and said first detector;

and wherein the step of expanding includes:

expanding said location hemisphere for each of said plurality of detectors with said time interval using the velocity of the acoustic wave.

13. (Original) The method according to claim 7 wherein said wavelet is a Doppler-shifted version of a wavelet of said acoustic wave of a known form.

14. (Currently Amended) A system for locating an object producing an acoustic wave by passive detection of the acoustic wave, wherein at least three signal are produced by detection of the acoustic wave at a plurality of detection points, the system comprising:

an object characteristic library containing wavelets derived from acoustic waves of known form;

a correlation mechanism for determining ~~correlating the at least three signals with~~ a wavelet from said object characteristic library that correlates with at least three signals;

a time difference mechanism for determining time difference of arrival (TDOA) measurements between each of the at least three signals using correlation intensity with said wavelet from said correlation mechanism;

an acoustic reciprocity mechanism for performing acoustic reciprocity at time intervals forming hemispheres centered around each of the plurality of detection points based on said TDOA measurements from said time difference mechanism to determine an intersection point of at least three hemispheres; and

a controller for coordinating said correlation mechanism, said time difference mechanism and said acoustic reciprocity mechanism;

wherein said intersection point represents a location of the object.

15. (Original) The system according to claim 14 further including:

a detection array having a plurality of passive acoustic detectors, each producing a signal on detection of the acoustic wave, wherein the plurality of detectors corresponds with the plurality of detection points.

16. (Original) The system according to claim 15 wherein said acoustic wave of a known form from which said wavelet is derived is produced by a known object and wherein said correlation mechanism includes:

an object identification mechanism for providing an identity for said object from which the at least three signals are obtained based on said wavelet.

17. (Original) The system according to claim 14 where said time different mechanism includes:

a peak correlation mechanism for determining points of peak correlation between said wavelet and each of the at lest three signals and measuring the time difference of said points between the at least three signals to form said TDOA measurements.

18. (Original) The system according to claim 16 wherein said system further includes: a validation mechanism for determining if each of said TDOA measurements meets validity criteria based on a time difference of acoustic wave detection between each of said plurality of detectors and possible speeds at which the object may be moving given said identity; and

a TDOA combinations storage for holding valid TDOA measurements.

19. (Original) The system according to claim 15 wherein said acoustic reciprocity mechanism includes:

a sphere generation mechanism for determining a first detector from said plurality of detectors having the earliest time of detection of the wave and generating a location hemisphere for each of said plurality of detectors, wherein a start radius for each of said

location hemispheres is reflective of said TDOA measurement between each of said plurality of detectors and said first detector;

a sphere expansion mechanism for expanding said location hemispheres for each of said plurality of detectors with said time interval using the velocity of the acoustic wave; and

a sphere intersection mechanism for examining said location hemispheres to determine an intersection point of at least three of said location hemispheres.

20. (Currently Amended) A computer readable medium having stored thereon computer-executable instructions for locating an object producing an acoustic wave, the acoustic wave being detected by a plurality of passive acoustic detectors formed in an array, the computer-executable instructions comprising:

(a) determining a wavelet ~~correlatable~~ that correlates with each of the at least three signals correlates, said wavelet being derived from an acoustic wave of a known form;

(b) determining time difference of arrival (TDOA) measurements between the at least three signals using correlation intensity with said wavelet;

(c) performing acoustic reciprocity at a pre-determined time interval from each of the plurality of detectors based on said TDOA measurements resulting in a hemisphere centered around each of the plurality of detectors;

(d) examining hemispheres produced from step (c) to determine an intersection point of at least three hemispheres;

(e) repeating (c) and (d) with a further time interval to increase the size of said hemisphere if said intersection point is not determined; and

wherein said intersection point represents a location of the object.

21. (Original) The computer-executable instructions according to claim 20 wherein said acoustic wave of a known form from which said wavelet is derived is produced by a known object and wherein said known object provides an identity for the object from which the at least three signals are obtained.

22. (Original) The computer-executable instructions according to claim 20 wherein step (b) includes:

determining points of peak correlation between said wavelet and each of the at least three signals; and

measuring a time difference of said points of peak correlation between the at least three signals to form said TDOA measurements.

23. (Original) The computer-executable instructions according to claim 21 wherein step (b) includes:

determining if each of said TDOA measurements meets validity criteria based on a time difference of acoustic wave detection between each of the different detectors and possible speeds at which the object may be moving given said; and

storing TDOA measurements that meets said validity criteria.

24. (Original) The computer-executable instructions according to claim 20 wherein step (c) includes:

generating a location hemisphere for each of the plurality of detectors based on an earliest acoustic wave detection time, said TDOA measurements and the velocity of the acoustic wave; and

expanding each of said location hemispheres using said time interval.

25. (Original) The computer-executable instructions according to claim 24 wherein the step of generating includes:

determining a first detector from the plurality of detectors having the earliest time of detection of the acoustic wave; and

generating said location hemisphere for each of the plurality of detectors, wherein a start radius for each of said location hemispheres is reflective of said TDOA measurement between each of the plurality of detectors and said first detector; and wherein the step of expanding includes:

expanding said location hemisphere for each of the plurality of detectors with said time interval using the velocity of the acoustic wave.

26. (Currently Amended) A system for locating an object in flight producing an acoustic wave by radar detection and by passive detection of the acoustic wave, wherein a radar system detecting the object produces a path for the object and wherein at least three

signals are produced by detection of the acoustic wave at a plurality of detection points, the system comprising:

an object characteristic library containing wavelets derived from acoustic waves of known form;

a correlation mechanism for determining ~~correlating the at least three signals with~~ a wavelet from said object characteristic library that correlates with the at least three signals;

a time difference mechanism for determining time difference of arrival (TDOA) measurements between each of the at least three signals using correlation intensity with said wavelet from said correlation mechanism;

an acoustic reciprocity mechanism for performing acoustic reciprocity time intervals forming hemispheres centered around each of the plurality of detection points based on said TDOA measurements from said time difference mechanism to determine an intersection point of at least three hemispheres, wherein said intersection point represents a location of the object;

a controller for coordinating said correlation mechanism, said time difference mechanism and said acoustic reciprocity mechanism; and

a comparator for comparing said location with the path from radar detection to verify said location.

27. (Original) The system according to claim 26 further including:

a detection array having a plurality of passive acoustic detectors, each producing a signal on detection of the acoustic wave, wherein the plurality of detectors corresponds with the plurality of detection points.

28. (Original) The system according to claim 27 wherein said acoustic wave of a known form from which said wavelet is derived is produced by a known object and wherein said correlation mechanism includes:

an object identification mechanism for providing an identity for said object from which the at least three signals are obtained based on said wavelet.

29. (Original) The system according to claim 26 where said time different mechanism includes:

a peak correlation mechanism for determining points of peak correlation between said wavelet and each of the at lest three signals and measuring the time difference of said points between the at least three signals to form said TDOA measurements.

30. (Original) The system according to claim 28 wherein said system further includes:

a validation mechanism for determining if each of said TDOA measurements meets validity criteria based on a time difference of acoustic wave detection between each of the plurality of detectors and possible speeds at which the object may be moving given said identity; and

a TDOA combinations storage for holding valid TDOA measurements.

31. (Original) The system according to claim 27 wherein said acoustic reciprocity mechanism includes:

a sphere generation mechanism for determining a first detector from said plurality of detectors having the earliest time of detection of the wave and generating a location hemisphere for each of said plurality of detectors, wherein a start radius for each of said location hemispheres is reflective of said TDOA measurement between each of said plurality of detectors and said first detector;

a sphere expansion mechanism for expanding said location hemispheres for each of said plurality of detectors with said time interval using the velocity of the acoustic wave; and

a sphere intersection mechanism for examining said location hemispheres to determine an intersection point of at least three of said location hemispheres.

32. (New) A method of locating an object producing an acoustic wave, the acoustic wave being detected by a plurality of passive acoustic detectors formed in an array to produce at least three signals, the method comprising:

(a) determining a wavelet that correlates with each of the at least three signals, said wavelet being derived from an acoustic wave of a known form, said acoustic wave being produced by a known object;

(b) determining time difference of arrival (TDOA) measurements between the at least three signals using correlation intensity with said wavelet;

(c) performing acoustic reciprocity at a pre-determined time interval from each of the plurality of detectors based on said TDOA measurements resulting in a hemisphere centered around each of the plurality of detectors;

(d) examining hemispheres produced from step (c) to determine an intersection point of at least three hemispheres; and

(e) repeating (c) and (d) with a further time interval to increase the size of said hemispheres if said intersection point is not determined;

wherein said intersection point represents a location of the object, and

wherein said known object provides an identity for the object from which the at least three signals are obtained.

33. (New) A method of locating an object producing an acoustic wave, the acoustic wave being detected by a plurality of passive acoustic detectors formed in an array to produce at least three signals, the method comprising:

(a) determining a wavelet that correlates with each of the at least three signals, said wavelet being a Doppler-shifted version of a wavelet of an acoustic wave of a known form;

(b) determining time difference of arrival (TDOA) measurements between the at least three signals using correlation intensity with said wavelet;

(c) performing acoustic reciprocity at a pre-determined time interval from each of the plurality of detectors based on said TDOA measurements resulting in a hemisphere centered around each of the plurality of detectors;

(d) examining hemispheres produced from step (c) to determine an intersection point of at least three hemispheres; and

(e) repeating (c) and (d) with a further time interval to increase the size of said hemispheres if said intersection point is not determined;

wherein said intersection point represents a location of the object.